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ABSTRACT

A study investigated the effect of training Dutch students to learn to derive word meanings from written context. Subjects, 64 grade 6 primary school children, were randomly divided into control and experimental groups. The experimental group followed eight lessons in their mothertongue (Dutch), while the control group followed their regular lessons in which no attention was given to learning from context. The training consisted of three main elements: a text-driven element in the form of "Wh-questions," a schema-driven element in the form of a definition format, and a stimulus for decontextualization in the form of instruction that entailed "negotiation of meaning." On a paper-and-pencil Contextual Word Learning Test, the experimental group's gain was not statistically significant. Think aloud protocols of the trained students were analyzed to get insight into how often and with what quality elements from the training are used by them. Findings suggest that the trained students who have gained from the training, in comparison to those who have not, show more awareness of what it takes to find out and define the meaning of an unknown word and more awareness of the need for decontextualization. (Contains 15 references, and 7 tables and 2 figures of data.) (Author/RS)

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Effects of the training of a word learning strategy

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Abstract[1]

This paper reports a study into the effect of a training in learning to derive word meanings from written context. In an experimental design with random allocation of students to an experimental and control condition, 32 grade six primary school children were the experimental students who followed eight lessons in their mothertongue (being Dutch). The 32 control students followed their regular lessons in which no attention was given to learning from context. The training consisted of three main elements: a text-driven element in the form of Wh-questions, a schema-driven element in the form of a definition format, and a stimulus for decontextualization in the form of instruction that entailed 'negotiation of meaning'. On a paper and pencil Contextual Word Learning Test the experimental group's gain of 0.2 standard deviation was not statistically significant. Think aloud protocols of the trained students are analyzed to get insight into how often and with what quality elements from the training are used by them. It is tentatively concluded that the trained students who have gained from the training, in comparison to those who have not, show more awareness of what it takes to find out and define the meaning of an unknown word and more awareness of the need for decontextualization.

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1. Introduction

The growth of word knowledge provides an outstanding example of children's capacities for learning. Children start learning the form and meaning of words in the first year of their lives and their vocabulary increases dramatically through the preschool and school years. Anglin (1993) estimates that the amount of words actually learned per day increases from 3.3 (1.5 years - grade 1) to 6.6 (grade 1 - grade 3) up to 12.1 (grade 3 - grade 5). To these psychologically basic words (Anglin, 1993, p. 5) an even sharper increasing amount of potentially knowable words, 2.3, 5.5 and 15.8 words per day respectively, is added through processes of morphological analysis and composition.

The mechanisms through which children acquire and expand their word knowledge have since long attracted the attention of theorists and researchers (cf Beck & McKeown, 1991). Obviously, many words are learned with support or instruction. Children learn vocabulary from parents, older siblings, teachers or others, when the referents of words are pointed out, or when their meaning is explained or circumscribed with the use of synonyms, superordinates and specifications or (simplified) definitions.

However, it is commonly assumed that such direct instruction alone cannot explain the rapid growth in vocabulary. According to Anglin (1993) morphological problem solving makes a major contribution to vocabulary growth, especially beyond grade 3. Still, a very substantial part of the growth cannot be explained, but by learning from context. Therefore, it makes sense to assume that many, if not most (Sternberg, 1987), words are learned or derived from oral or written context, without support of other language users. As Beck & McKeown (1991) put it: 'the role of context in vocabulary acquisition is prominent by default' (p.799).

The role of context in vocabulary learning is not a simple one, that much is clear from the available empirical evidence. What verbal knowledge is learned from context, depends on a number of conditions that have to do with characteristics of the task and the learner. Learning word meanings from context is not a highly effective process: Nagy, Anderson and Herman (1987) estimate that the chance of learning a word from context is 5%; the estimate of 6% of Shu, Anderson and Zhang (1995) is very similar.

The difficulty of learning word meanings from context can be illustrated by an example of a study among students from grade 6, 8 and 10. In this study (Van Daalen-Kapteijns, Schouten-van Parreren & De Glopper, 1993) we measured skills in learning word meanings from context. The following test item is one of average difficulty. The item contains a number of cues to the meaning of the unknown word 'polyglot'. Still, the full meaning of the word is derived by only 17, 26 and 32% of the students in grade 6, 8 and 10 respectively. A partially correct answer is given by 8, 6 and 18% respectively.

That journalist is really a polyglot. He travels across the whole world and never needs an interpreter. In each country he interviews people and always in their own language.

The importance of context as a source for vocabulary knowledge, the low effectiveness of context learning and the correspondingly modest skills of students point out the need for effective instruction. Beck and McKeown (1991) give a review of studies that have assessed the effects of training skills in learning word meanings from context. The studies reviewed have limited effects at best. Beck and McKeown conclude that "the potential importance of context as a vocabulary-learning source and the apparent difficulty in fully utilizing that source warrant a continued search for more effective instruction" (o.c. p.803). In this paper we present a study among grade 6 students that pursues this objective.

2. Theoretical basis of the training program

When students read a piece of text and encounter an unknown word different actions are possible. If they understand what the text is about and are not hindered by the presence of the unknown word, they probably read on because there is no need to stop and think what it might mean. If they understand on the whole what the text is about, but full comprehension is hindered by the unknown word, they have reason to try and figure out the word meaning, especially when they have come to appreciate reading as a source for vocabulary learning.

Figuring out a word meaning from context resembles trying to pull oneself up by one's bootstraps. How is it possible to derive the meaning of a word from a context that is not fully understood by the very presence of the word? We think help can be found by considering the beginning and the end of the learning process.

Text-driven

The ground from which one wants to pull oneself up may have one or more footholds in the form of clues to the meaning of the word; these clues can be used in a text-driven or bottom-up process. Clues can be found in the word itself and in the surrounding text.

Schema-driven

If one knows what it usually takes to define a word meaning, this kind of knowledge can be used in a schema-driven or top-down process. Students can actively search the context for the necessary definitional information. If the student has knowledge of the make up of definitions, he can go search the context to fill the empty slots of the schema.

Decontextualization

Somehow the text-driven and schema-driven processes must be attuned to each other. In the ideal case the text-driven search for meaning is steered from the schema and information found in the context is decontextualized

in order to give it a form that fits the schema. The person searching is going back and forth between context and schema until the fit is satisfactory.

An important means for the purpose of decontextualization is 'negotiation of meaning'. The issue to be negotiated is to what extent the information found is context specific and to what extent it can be generalized. The student, in this negotiation, must weigh the contextual information against the 'conventional' form that definitional information usually takes.

Our analysis resembles the process distinction of Sternberg (1987). Sternberg distinguishes three processes that come into play when a new word is learned from context. The first process, called 'selective encoding', entails separating information that is relevant for the meaning of the unknown word from irrelevant information. This process is (in our view) mainly operating text-driven. The second process, 'selective combination', would in our view be operating mainly schema-driven, as by this process a selection from the relevant information, found in the context about the new word, is combined to form a definition. 'Selective comparison', the third process by which new information is integrated with information already in memory, could have the function of a go-between, just as decontextualization has.

3. Setup of the training program

We have tried to construct a training program that would stimulate students to use both text-driven and schema-driven processes, in order to arrive at a decontextualized meaning of the unknown word. The training material consisted of pedagogical contexts that looked as natural as possible. We did not systematically vary the types of clues provided, but saw to it that various types of clues occurred in different contexts.

As a first help in working text-driven we wanted to teach students to use a set of questions to be asked of the context, in order to gather information about the word meaning. This set consisted of six Wh-questions: What ..., Who ..., Where ..., When ..., Why ... and How ...? The questions are in the same line as the '20 questions' used by Sternberg (1987) in a training for learning word meanings from context intended for students older than in our case (high school sophomores and juniors). We taught our students to use the six questions as examples for ones that they would like to ask of the context themselves.

We also wanted to make students aware of information that a word itself may give away about its meaning. We wanted them to look for this kind of information by *zooming in* on the word. At the same time, we told them explicitly to use this kind of information to check the information gained from the surrounding context. This procedure prevents students from making a wild guess on the basis of the word itself, and consecutively twisting the interpretation of the context to confirm this guess (Nation 1990). By zooming in on the word as a check on information gathered from the context, a student combines working text-

driven with the use of knowledge about word form and word parts.

As a help in working schema-driven we wanted to make students familiar with the form that most definitions take. For that purpose we introduced a *Definition Schema* to them (see Figure 1):

Figure 1. Definition Schema

The unknown word:	
general characteristic:	specific characteristic:
Definition:	

The Definition Schema resembles the Word Map that Schwartz & Raphael (1985) describe. What we call 'general characteristic' is the 'class' component in the Word Map, and the 'specific characteristic' has its equivalent in the Word Map under the heading of 'What is it like?' The Word Map has a third component in: 'What are some examples?', information about subordinates that is not represented in the Definition Schema. Schwartz & Raphael suggest that it is possible to teach primary school students in the middle grades and above to use the Word Map as a help in vocabulary learning.

An important part of the training is decontextualization through negotiation of meaning. This would mainly take place in a dialogue between the trainer and the students. The exact content of the dialogue is not prescribed, because it has to be tailored to the suggestions and reactions of the students. This issue is closely connected to the instructional approach of the training. (See also the separate section on the instructional approach).

A last ingredient of the training were several *metacognitive elements*. One element consists of making students aware of unknown words that they may encounter in contexts and of the different ways they can react when this happens. Such awareness is a condition that has to be met in order for the student to engage in deliberate attempts to derive the meaning of the word from the context. A second metacognitive element consists of reflection on what is learned at the end of every lesson. The goal of this element is to give students the opportunity to realize what they have learned.

Description of the Word Learning Strategy (WLS)

We tried to combine the principles mentioned above in the form of a coherent strategy, called 'Word Learning Strategy'. The strategy consists of three tactics that can be executed in consecution.

Tactic 1: the 'Brake-tactic' is meant to be used on encountering an unknown word. This tactic is meant to make students aware of unknown words they encounter while reading text.

Tactic 2: the 'Track-tactic' is meant to track down the meaning of the word. The 'Track-tactic' is the heart of the strategy. It consists of a number of steps. The first step is to make a 'substitution sentence'. This is a sentence or part of a sentence from the text in which the unknown word is replaced by dots. The second step is to ask a few Wh-questions on the basis of the 'substitution sentence', the answers to which are to be found in the sentence itself and in the surrounding sentences. The students could use Wh-questions that are provided or make up one or two by themselves. It is made clear that a question does not necessarily have to start with a 'Wh-word'. The third step is to find, from the information thus gathered, one of two things: another word with the same meaning (a synonym); or, if this is not available, a definition made up of a general characteristic and one or more specific characteristics. The answers to the Wh-questions must somehow be transformed into information that fits the definition format. So in this step the actual decontextualization must take place. The fourth and last step of the 'Track-tactic' is to check whether the solution (synonym or definition) fits the context.

Tactic 3: the 'Zoom-tactic' is meant to help by zooming in on the word itself and check whether this yields information that confirms the word meaning derived so far.

The tactics were summarized on a Strategy Card that the students could use.

Instructional approach and number and structure of the lessons

The pupils were trained by what is called 'general cognitive strategy instruction' by Rosenshine & Meister (1994). The role of the trainer in this kind of instruction is a modeling, guiding and checking one. Every new part of the training was first modeled by the trainer, who demonstrated what she wanted the students to learn while thinking aloud. In a second step the students as a group tried to do the same with an other example, in interaction with the trainer who guided and steered them. After that the students practiced what they had learned for themselves, while the trainer checked what they were doing. The essential parts of the training (asking Wh-questions, using the Definition Schema, decontextualisation and zooming in) were all taught in these three steps.

To teach the strategy for deriving words from context eight lessons of approximately one hour were constructed with Dutch material. In addition to these, two lessons were constructed in which the students practice the strategy for English words. For Dutch students in grade six, English is taught as a foreign language. Our subjects, at the time of the training, have had formal instruction in English for about one and a half schoolyear. A short description of all ten lessons is given below. The

trainer worked from a trainer's guide per lesson. The students worked per lesson in a booklet of their own.

In the beginning of every lesson a reference is made to what is done in the previous lesson. Then the subject matter of the lesson is modeled by the trainer or practiced by the students under guidance of and checked by the trainer. During the lessons practice schemas, with room for Wh-questions and the definition for the new word, are filled out. Every lesson ends with a few reflection questions, that are answered by the students for themselves and are then discussed in the group.

To make the lessons more stimulating the practice items for the students take different forms. Some items have the form of a game. Others have a form resembling the 'vignettes' that Paliscar & Brown (1989) used in their instruction for self-regulated reading. The students read the account of an imaginary pair of children who have used the Word Learning Strategy to figure out the meaning of an unknown word, they then discuss the way this is done.

The words used in the lessons

To construct the training material words were chosen from a dictionary that defines Dutch words for Dutch students in grade five through eight (Huijgen & Verburg 1987). Words were selected that were supposedly unknown to students in grade 6. Among these were difficult words referring to a well-known concept, for which the students would probably know a synonym (a translated example is 'accuracy' as the synonym for 'preciseness'). But most of the words selected referred to a meaning that was at least partly new, consisting of, for instance, an unknown refinement of a well-known meaning (like 'anecdote', as a refinement of the more general meaning of 'story').

The Word Learning Strategy was introduced and practiced with nouns, so most practice material consisted of nouns. But the pupils also practiced with verbs and adjectives. In the case of adjectives special attention was given to the Definition Schema. The students were instructed only to look for specific characteristics in this case, that specify the noun to which the adjective refers.

For the English lessons difficult English words were selected from textbooks for children who have had formal instruction in English as a foreign language for a year or more. The context of the difficult words had to be made up of words that most students would probably know. Most words selected were nouns and some of them verbs. No adjectives were selected. In the tenth lesson students could use the 'brake-tactic' at any word that they wanted to try and find the meaning of in a short story; some students did this on encountering an adjective.

The contexts used in the lessons

The contexts for the unknown words were constructed as 'pedagogical contexts' (Beck, McKeown & McCaslin 1983), meant to give information about the unknown word. Each context described a situation in which the unknown word was fairly typically used. Only one context per word was

offered because this is the situation that occurs most often in natural reading. It was made clear to the students that one context is not enough to find out the definite meaning of a word, but that it is often enough to get a good hunch about the meaning, that can be checked when the same word is encountered again. We hoped in this way to make students aware of the fact that word knowledge is not an all-or-none matter, but that it develops gradually.

Example of the way a student would proceed during instruction
An example (translated from Dutch) of one of the practice items reads as follows:

> I don't know much more about my grandfather than some anecdotes. This is the anecdote that my father likes best: how my grandfather, as a young man, once went through the ice. Grandfather thought that he would get less cold without all those wet clothes. So he took everything off except his pants. That is how he came home, with icenedles hanging from his mustache and brows. It must have been a funny sight. We have to laugh every time my father tells it.

Students would typically proceed as follows during instruction:
They start out using the 'Brake-tactic', by stopping at the word 'anecdote' and underlining it. Then they go on using the 'Track-tactic' to track down the meaning of 'anecdote'. In the first step they make a 'substitution sentence' like: 'This is the ..... that my father likes best'. In the second step they ask a few Wh-questions on the basis of this substitution sentence. In the left column of figure 2 possible Wh-questions are given, and in the right column possible answers to these.

Figure 2. Examples of possible Wh-questions and answers for 'anecdote'

possible Wh-questions	possible answers
What is it that my father likes best?	That story about my grandfather
Why does he like that best?	It makes us laugh
What is it about?	About my grandfather falling through the ice

In the third step the students try to find, from the information thus gathered, a synonym or a definition. In the case of 'anecdote' no synonym is available, so a definition has to be made up, consisting of a general characteristic and one or more specific characteristics. The dialogue that guides the decontextualization process would take the following form (slightly different with different groups of students, as it had to be adapted to the specific reactions of the students):

Trainer: 'So what we have got is: an anecdote is a story that makes us laugh and that is about my grandfather going through the ice. What does that tell us about the meaning of 'anecdote'? Does it tell us something about a general characteristic? About what sort of thing an anecdote might be?'

A student: 'an anecdote is a story about my grandfather'.

Trainer: 'right, here it is: a story about my grandfather, correct. Would that always be so? Is an anecdote always a story about my grandfather, or could it also be a story about someone else?'

Most students think that anecdotes might be about other people, so only the general characteristic 'is a story' is written down in the definition schema. The dialogue is continued with the trainer reacting to what the students say as much as possible while guiding them into the direction of a more or less context-free meaning for anecdote.

Explicit attention is given to the uncertain status of the derived information. If the answer to the second Wh-question 'it makes us laugh' is transformed into the specific characteristic 'is funny', the trainer discusses the need to check this when the word 'anecdote' is encountered in a different context.

To conclude the dialogue, a definition is formulated on the basis of the information in the schema and written down on the bottom line.

This is what the schema now contains:

The unknown word: 'anecdote'	
general characteristic:	specific characteristic:
a story	it is funny
definition: 'a story that is funny'	

In the fourth and last step of the 'Track-tactic' the students check whether this definition fits the context.

To conclude the derivation process the students use the 'Zoom-tactic'. They look closely at the word 'anecdote' to find out whether the word itself contains information that yields extra cues to the meaning derived so far. Zooming in on 'anecdote' does not give such clues. So the practice item is concluded by looking up the definition of the word in the dictionary. This reads (translated from Dutch): 'a short story, usually about a funny event from somebody's life'.

The trainer and the students discuss the dictionary definition in comparison with the definition as derived from the context. The main point in this discussion is not the correctness or incorrectness of the derived definition, but rather the status of the information found. In the example of 'anecdote', the trainer points at the piece 'it is about my grandfather falling through the ice when he was a young man'. Looking back, this could have been decontextualized to 'an event from somebody's life'. The trainer adds that, strictly speaking, you can not tell from

this single piece of text what goes only for this text, and what goes for the meaning of 'anecdote' in general, and that repeated occurrences of the word must make this gradually more clear.

6. The design of the experiment

The effects of the training program were assessed in an experiment. We used a true experimental design with random allocation of students to conditions. There were pre- and posttests of contextual learning, and reading comprehension posttests. Vocabulary pretests were used as covariates.

Subjects
In order to select experimental and control students we started out by pretesting four classes from different schools, grade 6, of Dutch elementary school children (11 to 12 years old). On the basis of their results on the pretest for contextual learning 16 students from each class were selected, four from each quartile of scores. From each set of four students two were randomly assigned to the experimental condition and two to the control condition. The 32 experimental students were to be trained, and the 32 control students were to follow their regular lessons.

Training and control program
The students in the experimental condition followed the training program that was described above. They followed eight lessons of approximately one hour with Dutch materials. The lessons were given at a pace of one lesson a week. Then the experimental subjects followed two lessons in which they practiced the strategy for English words.

The lessons for the experimental students were given during regular school hours. The control students took part in the normal program that contained no training of contextual learning skills.

Trainer
All four experimental groups were trained by the same instructor. She was trained to work along the guidelines that were provided in the trainer's manual per lesson. Before each lesson, several possible ways of going about the word learning items were discussed with one of the researchers, in order to prepare the trainer as good as possible for her interactive teaching task.

Measures
Measures were taken at three moments (see also Table 1). Four tests were administered at moment 1, three weeks before the training started; three tests at moment 2, about ten days after the eight mothertongue lessons had been given; and two tests at moment 3, one week after the two English lessons had been given. Mothertongue (Dutch) is indicated by L1, English as a foreign language by EFL.

Conceptual learning

The L1 Conceptual Learning Test has two parallel versions, version A administered at m1, version B at m2. Both contain 25 open-ended items. Version A was used to select experimental and control subjects. Version B is the main criterion task for the training, as the test items resemble the training items.

The EFL Conceptual Learning Test has three parallel versions, version A administered at m1, version B at m2 and version C at m3. All three contain 12 open-ended items. Version A is used as a covariate; Version B and C are intended as measures of near transfer of the ability to derive word meanings from context.

Before the administration of each Conceptual Learning Test, knowledge of the target words was checked in a short pretest. The target words were presented underlined in short non-informative sentences. The students were asked to indicate if they knew anything about the meaning of each underlined word, and if so to write down what they thought the word meant. If a student had any knowledge about a word, the corresponding item in the Conceptual Learning Test was not taken into account for this student and the student score was estimated on the basis of the remaining items.

Vocabulary

The L1 Vocabulary Test (m1) contains 60 four-choice items. This test is used as a covariate in the Analysis of Covariance, to take into account pre-existing differences between students in vocabulary.

The EFL Vocabulary Test (m1) is made up of 64 open-ended items. Like its L1 counterpart, it is used as a covariate.

Reading comprehension

The L1 Reading Comprehension Test contains 24 four-choice items. This test is intended as a measure of transfer of the skill in deriving word meanings to text comprehension. This transfer can be expected if the students, trained in the thorough analysis of a piece of text in order to find information about an unknown word, use the same kind of analysis to better understand what the text is about.

The EFL Reading Comprehension Test consists of five stories of circa ten lines, about each story four comprehension questions are asked (resulting in 20 items). This test, like its L1 pendant, is meant to measure any transfer that occurs from derivation of word meanings to text comprehension.

Hypotheses

The main hypothesis is that the trained students, compared to their control classmates, will improve their skill in deriving word meanings from context in L1. If confirmation of this hypothesis is found three other hypotheses are stated exploratory: improvement in derivation in L1 shows transfer to improvement in derivation in EFL for the trained students; improvement in derivation in L1 transfers to improvement in reading

comprehension in L1 for the trained students, both improvements translate to improvement in reading comprehension in EFL.

Analyses

Analysis of covariance was used to compare the results of the experimental and control students at moment 2 and 3. Measures taken at moment 1 were used as covariates. Dependent measures at moment 2 were: the L1 Contextual Learning Test Version B, the EFL Contextual Learning Test Version B, and the L1 Reading Comprehension Test. Dependent measures at moment 3 were: the EFL Contextual Learning Test Version C, and the EFL Reading Comprehension Test.

5. Results

Means and standard deviations for all measures are given in Table 1. The analyses of covariance are summarized in Table 2a to 2e. As tables 1 and 2a show, the difference between the experimental and the control subjects on the most relevant dependent measure, L1 Contextual Learning (B), is 0.2 standard deviation, which is statistically not significant. This lack of effect makes it understandable that no difference is obtained on EFL Contextual Learning (B) and (C), as these two tests were meant as measures of near transfer. Also on the measures of far transfer (L1 and EFL Reading Comprehension) no effect is found.

We wanted to explore if any effect of the training, although not evident in the learning product scores, would be discernible in the learning process for L1. Therefore we did a sequel to the training experiment, in which we gathered think aloud protocols. This sequel is described in the next section.

6. The think aloud sequel

Subjects

We selected three subgroups of students: 8 trained students who seem to have profited from the training; 8 trained students who seem not to have profited from it; the 16 students from the control group to serve as controls of the selected trained subjects.

To make the selection of trained students, Z-scores were computed for the scores on L1 Contextual Learning (A) and (B). Eight students were selected whose Z-score on version B was higher than that on version (A); these students supposedly have profited from the training. Also eight students were selected whose Z-score on version B was lower than that on version A; these students supposedly have not profited.

Since selection on the basis of difference scores can suffer from statistical regression towards the mean, we checked our initial selection by performing regression analysis and selecting students on the basis of the magnitude of their residual scores. The two types of selection correlate .90.

The 16 trained students, thus selected, and their 16 untrained

controls, were asked to take part in an individual think aloud session. The sessions were run a few weeks after the training had been finished.

The words and contexts used

From the dictionary difficult L1 (Dutch) words were selected, that we expected to be unknown to the students. For these words (eight nouns and two verbs) no simple synonyms exist, so the students would have to give a description in the form of a definition. Three difficult EFL (English) words (one noun, and two verbs) were selected in the same way as was done for the lessons.

The contexts for the unknown words were constructed in the same way as described for the training material, that is as 'pedagogical contexts' (Beck, McKeown & McCaslin 1983), meant to give information about the unknown word. Each context described a situation in which the unknown word was fairly typically used.

Procedures

The procedure during the think aloud session for the trained students was like this. The students were given the instruction to derive the meaning of the underlined word in each piece of text, while thinking aloud. They were given one or two practice items to get used to the think aloud situation. They could make use of material that they had used during training: on their desk an exemplar of the Strategy Card was available as well as a few practice schemas. The experimenter told the students that they could use this material if they wanted, but that they didn't have to. The control students did not have material from the training at their disposal, but in all other respects the procedure for them was the same as for the trained students.

A session per student consisted of two rounds, each round lasting about half an hour. In round 1 the items were handled in the following way. Per item the experimenter would ask: 'do you know the meaning of (the target word)?'. If the meaning was known (which was the exception) the item would be skipped. If the meaning was unknown, the student tried to derive it from the piece of text while thinking aloud. The role of the experimenter was limited to an occasional encouragement to the student to keep thinking aloud. If the student was satisfied with what he had figured out about the word meaning, he told the experimenter to write down the result on the word list that the experimenter had before her. This moment marked the end of the item. After all items were worked through in this way, round 1 was concluded. The think aloud material, gathered during this first round, is considered as the protocols proper.

Round 2 consisted of a discussion of what was written down on the word list in round 1. Per item the experimenter would read what the student had stated as the meaning of the target word. The student could comment on this meaning, and give additional information on how he or she had arrived at it. Also he could revise or adjust it. If the given meaning was incomplete or not quite correct, the experimenter would give prompts to see if the student would arrive at the complete or correct

meaning with a little help. An item would be concluded by the experimenter reading the dictionary definition of the target word to the student.

Both round 1 and round 2 of a session were recorded on audiotape per student, resulting in 32 think aloud protocols for eight to ten items in L1 and three in EFL.

Analysis of the protocols

The protocols of the trained students were transcribed from tape by assistents, and analysed in the way described below. The protocols of the control students are currently being transcribed and analysed. We will report separately on the results for the control students in the near future.

Coding schema for the protocols

A procedure was developed to code the occurrence of elements from the training in the protocols. Codes were given for the following elements:

1 using a substitution sentence
2 using a Wh-question
3 producing a synonym
4 producing a superordinate category
5 producing a specification of that category
6 producing a circumscription of the word meaning in a nonconventional form
7 decontextualization
8 using the word form to get information about the word meaning
9 checking the word meaning by substitution in the substitution sentence
10 checking the word meaning by considering the whole fragment of text
11 using metacognitive knowledge

Parallel to the categories 3 to 6 it was marked whether the word meaning part produced was maintained in the word meaning stated at the end of the think aloud process (round 1).

Reliability of protocol coding

Coded were the protocols of the ten L1 items for round one for the 16 experimental subjects. Information from round two was used only to solve ambiguities in round one. All protocols were coded by one judge, and two to three items per subject (in total a quarter of all protocols) were coded independently by a second judge. Percentage agreement between the judges ranged from .80 to 1.00 for the different coding categories, with a mean percentage of agreement over categories of .94. The codes given by judge one are the data which are analysed in the following.

Coding categories for the word meanings

The word meanings stated by both the experimental and the control students at the end of the think aloud process (round 1) were judged on

four aspects:

1 Format The word meaning could have the form of: one word; one word plus one specification; one word plus two or more specifications; different from these.

2 Quality Quality in terms of 'communicative adequacy', regardless of the form, was judged on a scale from zero (inadequate) to 6 (fully adequate).

3 Decontextualization Degree of decontextualization was judged on a scale from zero (totally context-bound) to 4 (totally context-free).

4 Part of speech Coded was whether the part of speech of the word meaning as stated was the same as that of the target word.

Aspects 1 and 4 could be judged objectively. Aspects 2 and 3 were coded by two independent judges. Differences in the codes given were solved by discussion.

Exploratory analyses

The coding results were analyzed in two different ways. First, we studied univariate distributions of the protocol codes in order to find out with what frequency and quality specific elements of the experimental program show up in the way students deal with unknown words in context. Second, we compared protocol data from students that profited and from students that did not profit from the training.

7. Results concerning the protocol codes for the trained students

Frequency and quality of occurrence

Table 3 contains data regarding the univariate distributions of the frequency of the protocol codes. The codes given were counted per code over items per student and corrected for the items that were missing for the student concerned. The minimum score is 0, the maximum 10.

The quality of each protocol aspect, as it occurs, was given a score of 0 (it is in the wrong direction), 1 (it is in the right direction) or 2 (it is right or rightly used). Per student the quality score per aspect was determined, by taking the sum of the quality scores obtained and extrapolating this from the number of items that the student concerned had completed to the total number of 10 items. The minimum score is 0, the maximum score 20. Per aspect the number of students for which the aspect has been found in the protocols varies, therefore in table 4 this number is given per protocol code.

The results in table 3 and 4 are discussed by protocol code.

01 Using a substitution sentence.

We see that the trained students use such a sentence in about one third of the opportunities, and that the quality of the sentences is high.

02 Using a Wh-question.

Wh-questions are used less than 1 time per 10 items, but when used the

quality is high.

03 Producing a synonym and 04 Producing a superordinate.
It is interesting to note that the frequency of producing synonyms is about the same as that of producing superordinates, because the results on the Contextual Word Learning Test Version B showed an overwhelming majority of synonyms for the meanings of the target words, given by experimental as well as control students. The mean quality of the synonyms given (less than half the maximum score) is less than that of the superordinates (threequarter of the maximum score). This makes sense as in general no exact synonyms exist for the target words. It seems that the trained students still look for synonyms, but that thinking aloud they also show awareness of the fact that often no synonym exists for an unknown word, and that a superordinate plus specification is an alternative suitable way to state the word meaning.

05 Producing a specification of the superordinate category.
The frequency of this aspect is slightly less than that of superordinates; this is caused by the fact that sometimes a student clearly indicates that the superordinate needs to be specified, but that he or she does not know what the specification should be (for instance for 'dilemma', a student states that it is a kind of problem, but he really can't say what kind). The quality of the specifications is about half the maximum score. Producing superordinates and specifications with rather good quality can be seen as indications for the use of the definition format as presented to the students in the training.

06 Producing a circumscription in a nonconventional form.
We look at circumscriptions as products at a stage halfway between a context-bound and a more decontextualized word meaning. An example of a circumscription for 'dilemma' reads: 'she does not know what to choose'. We can interpret the findings concerning circumscriptions (frequency: slightly less then that of using synonyms and superordinates; quality: about the same as that of synonyms, less than that of superordinates) as an indication of the awareness of students that one word does not always suffice to state the meaning of the unknown word. At the same time we conclude that the students who use circumscriptions do not use the definition format: they seem to work bottom-up from the text, and don't arrive at a fully decontextualized word meaning.

07 Decontextualization.
The protocols of all students for almost every item show signs of decontextualization with a quality of more than half of the maximum score. We conclude that students see the task of deriving the meaning of the unknown word as a decontextualization task. Whether they do so more than they would have done without the training remains to be checked by comparison with the results of the control students.

08 Using the word form to get information about the word meaning.
We must take into account that only 2 of the 10 items had a word form that gave information about the word meaning ('personalia': a derived word, and 'hand- en spandienstem': a Dutch compound word). But even then, the mean frequency is very low (about one quarter). As the mean quality is based on only three cases, we will not interpret it.

09 Checking the word meaning by substitution in the substitution sentence and
10 Checking the word meaning by considering the whole fragment of text.
When we take aspect 09 and 10 together we see that checking does occur with a mean of about one third of the maximum and that the quality is rather good. As students in general don't do much checking spontaneously, we assume that the training has succeeded in stressing the need for checking in the context whatever has been derived from it.

11 Using metacognitive knowledge.
The frequency of using metacognitive knowledge is low but not zero and its quality is rather good. This is not unimportant as little gains in metacognitive knowledge may in the long run result in substantial gains in vocabulary.

12 Using own experiences.
Using own experiences as such has not received attention in the training. It can be seen as a possible consequence of implicitly asking Wh-questions (for instance "What is the case in the sitation described?")

13 Context-bound elaboration of the text.
Mean frequency of codes for this aspect is high neither low and the quality of the elaborations is rather good. Elaboration of the text has been the subject of the training as a consequence of working with the Wh-questions. To interpret the findings in aspect 12 and 13 further we will compare 'gain' and 'non-gain' students in the next paragraph. And we need the behavior of control students to reach a more firm interpretation for these aspects.

Differences between 'gain' and 'non-gain' students
Tables 5 and 6 contain data on the extent to which the think aloud protocols of 'gain' and 'non-gain' students differ. We inspect the outcomes for bottom-up, top-down and decontextualization elements separately. Table 7 contains data on the form and quality of the word meanings given by the students.

Bottom-up elements
'Using a substitution sentence' (01) and 'Using a Wh-question' (02) are both indicators of explicit use of bottom up elements. We see that 'non-

gain' students tend to show slightly more of this explicit use.

There are two categories that can be seen as implicit use of bottom-up elements, as these entail possible consequences of asking Wh-questions. One is 'Context-bound elaboration of the text' (13), the other 'Use of one's own experiences' (12). 'Non-gain' students tend to use slightly more own experiences, while 'gain' students show more elaboration. Whether the implicit uses of bottom-up elements are a result of the training remains to be seen; comparison with the protocols of the control students is needed to confirm or disconfirm this idea.

Top-down elements

'Producing a superordinate category' (04) and 'Producing a specification of that category' (05) are both seen as implicit use of top-down elements, as these could be the consequence of using the definition format as a schema to work towards. 'Gain' students do produce more superordinates and specifications, but the quality of these tends to be less than that of the (fewer) productions by the 'non-gain' students. 'Gain' students produce a little less synonyms than 'non-gain' students. This may mean that some 'gain' students know a little more about what it takes to define a word meaning; they may for instance be more aware of the fact that there is often no synonym available for the meaning of an unknown word. This is in line with the findings in the category 'Metacognition' (11): the few utterances in this category are predominantly uttered by 'gain' students.

Decontextualization activities

In the codes for 'Decontextualization' (07), given for each protocol as a whole, not much difference is found between the two groups. We do find a small difference in 'Producing a circumscription of the word meaning in a noncontextual form' (06). Such circumscriptions can be seen as products at a stage halfway between a context-bound and a more decontextualized word meaning. 'Gain' students tend to produce such circumscriptions a little more often and with more quality than 'non-gain' students. An example is found in the protocol of the 'gain' student who for the word 'facilities' gives the circumscription 'that everything is there'. From this it takes only one step to a more conventional word meaning.

Checking activities

Utterances in both categories on 'Checking the word meaning' (09: 'by substitution in the substitution sentence' and 10: 'by considering the whole fragment of text') tend to be found a little more with 'gain' students, the quality of the checking being a little better in category 09 and a little less in category 10, compared to the 'non-gain' students.

Format and quality of the word meanings stated by the students

As to the format of the word meanings stated by the students after thinking aloud (see table 7), the same trend is seen as in the process

codes: the 'gain' students give a little less synonyms and a little more superordinates plus specification(s) in comparison with the 'non-gain' students. The quality of the word meanings given was assessed without regard to the format. Judged was the 'communicative adequacy' of the content. This quality is a little better for 'gain' students (see table 7). So the differences we found in the process measures have a concomitant in the product as it is given right after thinking aloud.

Summary of differences between 'gain' and 'non-gain' students

In sum, the picture that emerges from the comparison of the protocols of 'gain' and 'non-gain' students looks as follows. The 'gain' students show less explicit use of bottom-up training elements, but seem to show more implicit use of these in the activity of elaborating the given text. Instead of only aiming at synonyms they tend to aim at more complete word meanings in the form of a superordinate plus specification as well. This aim is often only half reached and the attempt comes to a stop at a circumscription of the meaning of the word that is only half decontextualized, but offers a good basis for further decontextualization. They perform more checking operations and arrive at a word meaning of slightly better quality.

Again, the final word about the use of the training elements can not be spoken yet. To what extent the approach of the 'gain' students is a result of the training can only be concluded in comparison with the approach of the control students.

Evaluation of the experimental task

From the think aloud protocols it is clear that the task was a difficult one for the students. The unknown words referred to complex concepts for which no simple synonyms exist, and the students were asked to produce a meaning for these words 'as it could be found in a dictionary'. Suitable superordinates for complex concepts tend to be abstract ('problem' for 'dilemma', 'sign' for 'stigma', 'custom' for 'tradition') and are not always easy to find and produce. It is possible that effect of the training would have been obtained with easier words for simpler concepts. Still, the difficult words we have worked with have given rise to interesting processes that have ecological validity in view of the many complex concepts that students will be confronted with during the rest of their school years and careers.

6. General conclusions

We conclude that the training has been difficult for the students because of the inherent difficulty of the task to derive word meanings from context. And we conclude that the training has not succeeded in helping the students to handle and overcome this inherent difficulty. In the next paragraphs we go into these conclusions separately.

The inherent difficulty of deriving word meanings from context

The inherent difficulty of deriving word meanings from context has been the subject matter of the training in all three respects: the need to work bottom-up from the context, the need to work towards a conventional format and the need to decontextualize while working in this way. Deriving word meanings from context has been shown to the students in its full complexity. A possible negative effect of this is that the students have become cautious in what they are willing to derive, falling back on the strategy to only derive that information of which they are reasonably sure. A possible positive effect is that the students have become aware of the complexity of deriving a word meaning, and of ways to handle this complexity; an awareness that may help them in the future to develop strategic activity in using context to get information about a word meaning. A minimal example is given by the student who, asked about what she thought she had learned from the training, answered: '(I have learned that) if I don't know a word, what I have to do, that I don't have to look in a dictionary right away but that I simply .. can see, first read on, and then see if I can find it out for myself'.

This result, though minimal, is not unimportant in view of the many opportunities that will arise for this student to learn something this way. (See Nist & Olejnik 1995, p. 188: even college students don't seem to spend much time looking into context where this would be a sensible thing to do.)

Another example of the awareness of what deriving words from context is all about is given by a student who, in deriving the meaning for 'dilemma', is as it were negotiating with himself: '(...) it is a real dilemma, yes, a bit of a rotten situation I think, yes, but I don't know if it is always so that you have to choose between two things, that I don't know (...) it is a real choosing problem a bit, you have to choose between two things, well: problem with choosing'. This student, after weighing the information concerning 'between two things', decides to leave it out of the word meaning for now. He thereby proves to know that information about the meaning of a word from one context has to be confirmed in other ones. If he encounters the word 'dilemma' again in a context of having to choose between two things, he may remember his earlier weighing process and add the aspect 'between two things' to the meaning of 'dilemma' in his semantic memory. Moreover this student may have learned that deriving word meanings from context is an incremental process in general, in which case he will be well equipped for expanding his vocabulary while dealing with texts of all sorts.

Shortcomings of the training and suggestions for improvement

The training as an experimental treatment

In the training the main elements (Wh-questions and definition format) have been taught combinedly to the students. Therefore it is impossible to draw conclusions about the effectiveness or ineffectiveness of each separate element. To be able to do this one would have to train the two elements separately. The Word Learning Strategy lessons could easily be

split up into two separate series. In one series of lessons students could get acquainted with Wh-questions as a way to thoroughly search the context for information that relates to the unknown word meaning; consecutively they could practice in reformulating the derived information into a more decontextualized form. The use of Wh-questions is also useful for closely related verbal tasks like reading comprehension and for studying text (cf. Overmaat, 1996, p. 131-134).

In another series of lessons students could practice with the definition format by formulating aspects of word meanings very well known to them in a conventional form that fits the format. Consecutively they could learn to use this form as a couple of empty slots to be filled by searching the context for the required information. Students could also practice the use of the schema as a means for encoding and remembering selected information about the meaning of a word in a simple, verbalizable form. The schema could then function as a help in forming and retaining the word meaning as a stable unit, a unit that is suitable as a building block in a semantic memory structure.

Testing the effect of the two series of lessons sketched above would make clear the relative effectiveness or ineffectiveness of Wh-questions and the definition format as separate means for helping decontextualization.

Still another series of experimental lessons is feasible. This series would start from the finding that most students seem to prefer the simplest case: that of trying to find a synonym, or at least trying to find one word that more or less captures the meaning of the unknown word. In other words, this series would start from the 'primitive routines that get the job done' (Garner 1990). The strategy to be taught to the students would have this for step one: look for one word that you think has a meaning close to that of the unknown word and use this as a model word (see Van Daalen-Kapteijns & Elshout-Mohr 1981). Step two would be: see if you can add something to this model word, to make the meaning more precise. In the lessons concerned something would have to be said about the phenomenon that only few words are exact synonyms, and that most of the time a different word has a different or at least partially different meaning. Step three would consist of checking operations. First the model word plus addition would have to be checked in the context. And second it would have to be "checked" in the semantic field: how plausible is it that there is a separate word (the target word) to refer to this meaning (the model word plus addition)? In other words: is there a lexical gap that could be filled by the model word plus addition?

This strategy, starting from a model word, differs from what we have tried to do in the training as it was given. In the training we have offered the students the definition format as an empty model to be filled from the context. Maybe it is easier for students to start with an already filled model and then to adapt it with help from the context.

All three series of lessons outlined in this paragraph seem interesting candidates for future research.

Training as a feasible part of a vocabulary curriculum

The Word Learning Strategy, as it has been taught, has consisted of too many elements for the number of lessons, or of too few lessons for the number of elements trained. If one or more of the three series of lessons as outlined above prove to be successful in future research, they are better candidates for use in the classroom than the complex training. The three series, embedding different strategies, would not have to exclude one another. It is conceivable that they are all part of a curriculum in which learning students to become strategic in the development of their vocabulary has an important place. The different strategies can be offered to students as alternative rather than complementary strategies to help decontextualize information. In such a curriculum students would also have to be taught when the use of the diverse strategies is likely to be successful.

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Table 1 Time of administration, Means and Standard Deviations for all measures

	Time	Experimental subjects (n=32)		Control subjects (n=32)	
		M	SD	M	SD
L1 Vocabulary	m1	38.94	9.43	37.44	9.49
EFL Vocabulary	m1	22.02	13.15	23.90	15.06
L1 Contextual Word Learning (A)	m1	6.83	2.93	7.23	3.18
L1 Contextual Word Learning (B)	m2	8.52	3.58	8.24	3.94
EFL Contextual Word Learning (A)	m1	3.29	3.27	3.68	3.36
EFL Contextual Word Learning (B)	m2	2.34	2.71	1.98	2.41
EFL Contextual Word Learning (C)	m3	3.83	3.36	3.95	3.23
L1 Reading Comprehension	m2	14.52	3.73	13.93	3.52
EFL Reading Comprehension	m3	10.98	3.60	10.85	4.12

Table 2a Analyses of Covariance of the scores on L1 Contextual Learning (B) with covariates L1 Contextual Learning (A) and L1 Vocabulary

Source of Variation	Sum of Squares	DF	Mean Square	F	Significance of F
Treatment	1.365	1	1.365	.150	.700
School	41.953	3	13.984	1.533	.217
2-way interaction Treatment x School	7.948	3	2.649	.290	.832

Table 2b Analysis of Covariance of the scores on EFL Contextual Learning (B), with covariates EFL Contextual Learning (A) and EFL Vocabulary

Source of Variation	Sum of Squares	DF	Mean Square	F	Significance of F
Treatment	7.137	1	7.137	2.449	.124
School	38.130	3	12.710	4.362	.008
2-way interaction Treatment x School	2.374	3	.791	.272	.846

Table 2c: Analysis of Covariance of the scores on EFL Contextual Learning (C) with covariates EFL Contextual Learning (B), EFL Contextual Learning (A) and EFL Vocabulary

Source of Variation	Sum of Squares	DF	Mean Square	F	Significance of F
Treatment	.134	1	.134	.039	.845
School	11.679	3	3.893	1.123	.350
2-way interaction Treatment x School	5.915	3	1.972	.569	.638

Table 2d Analysis of Covariance of the scores on L1 Reading Comprehension with covariates L1 Contextual Learning (A) and L1 Vocabulary

Source of Variation	Sum of Squares	DF	Mean Square	F	Significance of F
Treatment	.744	1	.744	.120	.731
School	28.423	3	9.474	1.524	.220
2-way interaction Treatment x School	20.406	3	6.802	1.094	.360

Table 2e Analysis of Covariance of the scores on EFL Reading Comprehension with covariates EFL Contextual Learning (B), EFL Contextual Learning (A) and EFL Vocabulary

Source of Variation	Sum of Squares	DF	Mean Square	F	Significance of F
Treatment	3.156	1	3.156	.532	.470
School	43.324	3	14.441	2.433	.077
2-way interaction Treatment x School	4.846	3	1.615	.272	.845

Table 3 Means and Standard Deviations of frequency of occurrence of the protocol codes (n=16)

Protocol Code	M	SD
01 substitution sentence	3.51	2.85
02 Wh-question	0.81	1.59
03 synonym	4.00	3.01
04 superordinate	4.09	1.36
05 specification	3.65	1.44
06 circumscription	3.77	2.65
07 decontextualization	9.45	0.85
08 word form	0.24	0.51
09 checking in sentence	1.66	1.59
10 checking in text	1.99	1.61
11 metacognition	0.63	0.92
12 own experiences	1.33	1.66
13 elaboration	2.78	2.23

Table 4 Means and Standard Deviations of quality of occurrence of the protocol codes

Protocol Code	M	SD	n
01 substitution sentence	19.08	2.01	13
02 Wh-question	19.38	1.25	4
03 synonym	9.42	4.00	13
04 superordinate	15.11	2.49	16
05 specification	10.15	5.30	16
06 circumscription	9.31	1.92	13
07 decontextualization	12.47	2.24	16
08 word form	13.33	11.55	3
09 checking in sentence	14.62	7.76	13
10 checking in text	13.85	6.18	13
11 metacognition	13.33	5.16	6
12 own experiences	14.54	6.91	9
13 elaboration	14.62	4.52	14

Table 5 Means and Standard Deviations of **frequency** of occurrence of the protocol aspects for 'non-gain' and 'gain' students; difference in terms of standard deviation for the whole group (d)

protocol code	'non-gain' students (n=8)		'gain' students (n=8)		
	M	SD	M	SD	d
01 substitution sentence	3.66	2.90	3.37	2.99	- .10
02 Wh-question	.97	1.83	.66	1.42	- .20
03 synonym	4.62	3.56	3.38	2.37	- .41
04 superordinate	3.53	1.15	4.65	1.80	+ .82
05 specification	3.11	1.37	4.20	1.38	+ .76
06 circumscription	3.21	3.23	4.33	1.96	+ .42
07 decontextualization	9.50	1.07	9.41	.63	- .12
08 word form	.30	.55	.18	.51	- .24
09 checking in sentence	1.44	1.75	1.88	1.89	+ .28
10 checking in text	1.73	.58	2.25	2.16	+ .32
11 metacognition	.13	.35	1.14	1.05	+1.10
12 own experiences	1.60	1.69	1.06	1.69	- .33
13 elaboration	2.05	2.29	3.50	2.07	+ .65

Table 6 Means and Standard Deviations of **quality** of the protocol aspects for 'non-gain' and 'gain' students; difference in terms of standard deviation for the whole group (d)

protocol code	'non-gain' students		'gain' students		
	M	SD	M	SD	d
01 substitution sentence	19.34	2.79 (n=6)	19.71	.76 (n=7)	+ .69
02 Wh-question	20.00	0.00 (n=2)	18.75	1.77 (n=2)	-1.00
03 synonym	8.66	2.69 (n=6)	9.91	5.04 (n=7)	+ .26
04 superordinate	15.94	2.80 (n=8)	14.29	1.98 (n=8)	- .66
05 specification	10.42	7.17 (n=8)	9.88	2.95 (n=8)	- .10
06 circumscription	8.21	2.08 (n=5)	9.99	1.57 (n=8)	+ .93
07 decontextualization	12.13	2.81 (n=8)	12.81	1.62 (n=6)	+ .30
08 word form	10.00	14.14 (n=2)	20.00	0.00 (n=1)	+ .87
09 checking in sentence	13.34	8.17 (n=6)	15.71	7.87 (n=7)	+ .31
10 checking in text	15.00	5.00 (n=7)	12.50	7.58 (n=6)	- .41
11 metacognition	10.00	0.00 (n=1)	14.00	5.48 (n=5)	+ .78
12 own experiences	14.67	5.06 (n=5)	14.38	9.66 (n=4)	- .04
13 elaboration	10.83	3.76 (n=6)	17.46	2.51 (n=8)	+1.47

Table 7 Means and Standard Deviations for the **format and quality** of the word meanings given by 'non-gain' and 'gain' students, differences in terms of standard deviation for the whole group (d)

	'non-gain' students (n=8)		'gain' students (n=8)		
format of word meaning	M	SD	M	SD	d
one word	4.54	3.97	3.73	3.03	- .24
one specification	1.33	1.56	1.56	.96	+ .18
more specifications	.87	.79	1.17	.68	+ .41
different	3.26	3.56	3.55	2.40	+ .10
quality of word meaning	28.01	6.04	30.06	4.40	+ .39